

Science & Environmental Education: Community Connections, Impacts & Actions

3rd Grade Curriculum

*What Power Do People Have To Reduce
Impacts of Weather Hazards?*



Environmental education is lifelong learning process that leads to an informed and involved citizenry having the creative problem-solving skills, scientific and social literacy, ethical awareness and sensitivity for the relationship between humans and the environment, and commitment to engage in responsible individual and cooperative actions.

Purpose of

ENVIRONMENTAL EDUCATION

By these actions, environmentally literate citizens will help ensure an ecologically and economically sustainable environment.



The following integrated unit is designed for teachers and students to engage in an interdisciplinary study of science and the environment through literacy and math lessons. The lessons and activities are not meant to be done in isolation, but in support of and during literacy and math time.

Each day has a suggested structure with room for teachers to infuse more interactive play, discussions, or videos as well as adjust pacing as makes sense for their class. The summative assessment is designed to assess the NGSS, with several formative checks along the way for CCSS, used as the teacher sees fit.

This unit connects to the specific literacy theme of "Power." This will be culmination of the larger unit around weather and climate. Students will focus on understanding how severe weather impacts life, health, property, and environment.

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Students in Wisconsin will be able to

- Develop and connect with their sense of place and well-being through observation, exploration and questioning.
- Analyze the interactions and outcomes of cycles and flows in natural and cultural systems.
- Investigate and analyze how change and adaptation impact natural and cultural systems.

This integrated unit uses NGSS and CCSS as the backbone to planning and infusing environmental education standards into the curriculum.

Wisconsin Standards for Environmental Literacy and Sustainability

NGSS PERFORMANCE EXPECTATION	DISCIPLINARY CORE IDEAS	SCIENCE AND ENGINEERING PRACTICES	CROSS CUTTING CONCEPTS	COMMON CORE ELA	COMMON CORE MATH
<p>3-ESS3-1</p> <p>Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.</p>	<p>A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts.</p>	<p>Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem.</p>	<p>Cause and effect relationships are routinely identified, tested, and used to explain change.</p>	<p>CCSS.ELA-LITERACY.RI.3.3 Describe the relationship between a series of historic events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.</p> <p>CCSS.ELA-LITERACY.W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons.</p>	<p>CCSS.MATH.CONTENT.3.MD.A.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). 1 Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.</p>

Day 1: [Severe Weather Introduction](#)

Day 2: [Droughts](#) and [Wildfires](#)

Day 3: [Electric Storms](#)

Day 4: [Tornadoes](#)

Day 5: [Floods](#), [Hurricanes](#) and [Costal Flooding](#)

Day 6: [Earthquakes](#) and [Tsunamis](#)

Day 7: [Blizzards](#) and [Ice Storms](#)

Day 8: [Hazard Research](#)

Day 9: [Severe Weather Field Experience](#)

Day 10: [Making Connections](#)

Discussion: What is weather?

Have students discuss in groups what weather and climate are and how they are different.

Watch: [*Weather vs. Climate*](#)

Science Journal Prompt:

In a science journal, have students list different types of weather patterns they would consider normal, based on their everyday experiences. *Science journal prompts can be answered in the [*Notebook Templates*](#), a journal, book creator, or through posters.*

Read: [*Weather Detectives*](#) by Mark Eubanks

Activity: Weather Data Collection

Begin collection of weather data. Students can focus on the following variables: temperature, wind speed and direction, humidity, air pressure, and precipitation.

(Download Numbers App template found [here](#) to graph data on iPad).

Continue collecting data daily as it will be used on day 9 to connect how weather affects surrounding water bodies.

Watch: [*Extreme Weather*](#)

*Possible introduction to weather watching: [*Be a Weather Watcher*](#)*

Discussion: What is severe weather?

In groups, have students list the severe weather patterns they saw and discuss the questions:

Have you ever experience any severe weather? How did you know it was severe?

Watch: [*Severe Weather*](#)

Science Journal Prompt:

What is the difference between severe weather and expected weather conditions?

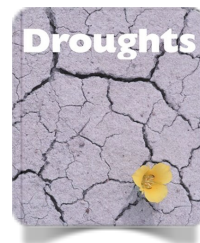
Have students answer the question and give supporting details.

Activity: [Does The Land or Water Warm Faster?](#)

Watch: [Land and Water](#)

Discussion: Why do land and water absorb light differently?

After watching the Crash Course video, perform the experiment that demonstrates how land and water absorb light differently. Discuss the results and transition into talking about the formation of droughts.



Read: [Drought](#) by Patrick Merrick

Activity: [How Much Is Your Daily Indoor Water Use?](#)

Watch: [Cape Town is on the Verge of Running Out of Water](#) and [Drought](#)

Discussion: What happens when the water disappears?

Pose the questions: *What causes droughts? Why do droughts form?* Discuss in table groups, then share ideas as a class.

Activity: [Dry Soils: Sponge Model](#)

Using two sponges, one oven-dried and one air-dried, show how when there is low humidity, the soils are unable to absorb water. Pour water on both sponges to see water “bounce” off the oven dried sponge. Explain how when soils get too dry water reabsorption does not happen as fast, just like with the oven-dried sponge. This can be done as a class demonstration or as a paired activity.

Discussion: What is a mudslide?

After the sponge activity, discuss how the surface layer of the soil can slide when heavy rains hit after a drought, causing a mudslide.

Science Journal Prompt:

Droughts are formed when.....

Have students finish the sentence and give supporting details.

[Participate in Drinking Water Week](#)

Read: [Wildfires](#) by Kathy Furgang and [Wildfires](#) by Seymour Simon

Watch: [Wildfires 101](#)

Activity: *SmokeyToons*

Using the *SmokeyToons* grade 2-3 activity in the [LEAF K-12 Wildland Fire Guide](#) by UW-Stevens Point examine how fires cause changes to the landscape where they occur. This guide also overviews what fires need to exist and how to prevent fires.

Watch: [State Natural Areas- Prescribed Fire 2017](#)

Discussion: **How does fire change its environment?**

Pose the question: *What causes fires?* Discuss the natural causes of fires and how fires help the surrounding environment. Be sure to highlight how fires renew the landscape and can help some plant species grow. Next pose the question: *What is the difference between a controlled burn and a wildfire?* Have students discuss the differences and then talk about fire safety and prevention.

Science Journal Prompt:

Wildfires begin when.....

Wildfires can help their environment because.....

Have students finish the sentences and give supporting details.

Watch: [Up, Up & Away](#)

Discussion: **What Is wind?**

Pose questions about how different aspects of the earth create wind and how wind affects weather.



Spanish Text: Las Tormentas- Jenny Wood

Watch: Lightning Storms at Night

Activity: Make Lightning in Your Mouth

Explain how the spark formed from the candy is due to electric charges between the candy and the air reacting. Explain how the same process takes place during a lightning storm. Use the activity Make Lightning and ZAP! to explain how static electricity works and how it causes lightning.

Watch: How Does Lightning Work? and Single Stroke CG in High Speed

Use these videos to show how positive ground charges and negative charges in clouds interact.

Read: Lightning by Seymour Simon

Discussion: What causes the sound of thunder?

Explain how lightning is caused by the expansion of air around a lightning bolt. Pose the question: *Why don't you hear thunder at the same time you see lightning?* Lead students to the answer that the reason you see lightning before you hear thunder is due to light traveling faster than sound.

Science Journal Prompt:

Have you ever heard thunder and not seen lightning? What could be causing the thunder?

Have students answer the questions and give supporting details.

Activity: Egg In A Bottle

Explain how when air is heated it expands and takes up more room and while some escapes from the bottle. When all the matches go out, the air inside the bottle cools and contracts. A low pressure system is created inside the bottle. The greater pressure outside the bottle forces the egg into the bottle.

Watch: Current Events

Discussion: **How does wind create weather?**

Using the investigating cold and warm fronts activity and the Crash Course videos, discuss how the pressure differences between warm and cold air create weather. Pose questions about the causes and effects of wind in relation to weather.

Optional: Calculate the Distance of Lightning Strikes, Lightning

Using the guide, calculate how far lightning strikes would be at varying time intervals.

Day 4 TORNADOES

Advanced Reading: [The Joplin Tornado](#)
Spanish Text: [Los Tornadoes](#)

Watch: [Tornado Footage from Washington County](#), [Surveying Damage After Washington County Tornado](#)

Read: [Tornadoes](#) by Seymour Simon and [Tornado](#) by Stephen Kramer

Watch: [How Do Tornadoes Form?](#) or [What is a Tornado?](#)

Activity: [Tornado In A Bottle](#), [Tornado Simulator](#)

Watch: [Weather Channels](#)

Discuss how jet streams and fronts are caused and how fronts shape weather.

Activity: Investigating Cold And Warm Fronts ([Wacky Water](#))

Using cold and warm water tinted with food coloring, you model how warm and cold fronts interact to form weather. Be sure to include breaks in the activity for observations and predictions in their notebooks, as well as for small group discussion.

Discussion: How do fronts create weather? ([Creating a Weather Front](#))

Using the investigating cold and warm fronts activity and the Crash Course videos, discuss how the the differences in temperatures in the fronts help create weather. Pose questions about how changes in pressure systems, jets streams, and temperatures would affect the weather.

Science Journal Prompt:

Tornadoes are cause by.....

Have students finish the sentences and give supporting details.

*The Pearson interactive
[Weather Fronts](#) can help guide
this discussion.*

Optional: Get involved with [STEP](#) during tornado week.

Optional: [Firestorms](#)



Read: [*Floods \(Forces of Nature\)*](#) by Peter Murray

Watch: [*4 Types of Floods*](#)

Activity: [*Rainfall Calculator - How Much Water Falls During A Storm?*](#)

Using the converter above, explore how many gallons (or bathtubs worth) would be filled with rain during storms. Use historical data, imagined data, or data from the class collection.

Watch: [*Flooding in Wisconsin*](#) and [*Aerial View of Burlington, Wisconsin Flooding*](#)

Discussion: What's in flood water?

Using the above videos, talk about how dirty and dangerous flood water can be. Use the video below or pose questions such as: *What did the water from the videos have in it? Did the water look clean? What could be in the water?*

Watch: [*Floods Explained*](#), BrainPOP [*Floods*](#)


Get your [*Project Wet*](#) certification for additional activities!

Activity: Sand Bagging

Find out which material holds back floodwaters the best. Before the experiment, ask students to record which material they think will best hold out the water: sand, soil, or gravel. Using three socks per group, have students fill each sock with one of the three materials. Using a bucket or similar container, cut a hole in the bottom. Place one of the filled socks inside the bucket, so it covers the hole. Place a large measuring cup to collect water underneath the bucket. Have students pour 2 liters of water into the bucket. After one minute, record the water level in the measuring cup. Repeat with the other two materials. Have student record their findings in their science journals. Discuss which material prevented water from leaking through to the measuring cup underneath and why this would be.

Science Journal Prompt:

Which type of material held back the flood waters best? Which material did not work?
Have students answer the questions and give supporting details.



Advanced Reading: [*I Survived Hurricane Katrina*](#)
Spanish Texts: [*Huracán*](#), [*Inudación*](#)

Watch: [*Hurricanes 101*](#)

Read: [*Hurricanes*](#) by David and Patricia Armentrout and [*Hurricanes*](#) by Seymour Simon

Activity: [*Hurricane Simulation*](#) and [*Hurricane Hero*](#)

Explore the relationship between surface sea temperature and hurricane strength. Be a hero by predicting where the hurricane will make landfall, using the knowledge from this lesson!

Watch: [*Anatomy of a Hurricane*](#) and [*Under the Hood*](#)

Discussion: Explore the [*Coriolis effect*](#)

Discuss how some parts of the earth have shorter distances to travel within the span of a day and how this affects the weather. Tie this back to previous lesson about how weather is formed via wind/ wind currents, temperature, and pressure.

Watch: [*The Coriolis Effect*](#)

Science Journal Prompt:

How does the Coriolis effect create spinning storms?

Have students answer the questions and give supporting details.

Advanced Reading: [The Japanese Tsunami](#)
Spanish Texts [Las Inundaciones y Las Ventiscas](#)

Watch: [Tsunamis 101](#)

Read: [Tsunamis](#) by Thomas K. Adamson

Activity: [The Great Shake Out](#)

Using the activities from the Southern California Earthquake Center measure the magnitude of an earthquake, create your own tsunami, and more!

Discussion: What causes tsunamis?

Use the discussions from the Great Shake Out activities to discuss how and why tsunamis form. Then discuss the effects of tsunamis and how flooding and tsunamis are linked by their shared influx of water.

Science Journal Prompt:

Why do tsunamis normally have more than one wave? Have students answer the question and give supporting details.

Activity: [Cloud Lab](#)

Classify and explore different types of clouds and how they form. Analyze weather data to predict storm formation and movements.

Activity: I Can Be A Meteorologist!

Have students in table groups research the [tools](#) meteorologists use to forecast the weather and the [different types of forecasts](#). Groups should present these tools using a collaborative medium*.

Science Journal Prompt:

During the presentations, have students summarize each tool and how meteorologists use the tools to forecast the weather.

**Demonstration, Book Creator, powerpoint, poster, or iMovie presentation*



Advanced Reading: [Children's Blizzard](#)
Spanish Text: [Ventisca](#)

Read: [Curious About Snow](#) by Gina Shaw

Activity: [Snowflakes In A Jar](#) or [Snowflakes Applet](#)

Have students create their own snowflakes. Use these snowflakes to talk about how snow is formed and the differences between individual snowflakes structures.

Discussion: **How does a snowflake form?**

While students are making their own snowflakes, talk about how snowflakes form. Pair this activity with *Frost On A Can* to tie into a discussion of ice storms and how frost forms.

Activity: [Frost On A Can](#)

Have students make frost. Discuss how frost and ice form.

Read: [Whiteout! A Book About Blizzards](#) by Rick Thomas

Watch: [Dangerous Cold Invades Upper Midwest](#), [Midwest Hammered By Winter Storm](#), [White Out](#)

Activity: [Winter Snowstorm In A Jar](#)

Have the students make their own blizzards.

Discussion: **What is a blizzard?**

Talk about how a blizzard is a storm with low visibility and high winds.

Watch: [What Is A Blizzard?](#)

Science Journal Prompt:

What weather patterns that we have learned about cause winter storms?

Have students answer the questions and give supporting details.

Optional: [Thundersnow](#)

Get your [Project Wet](#) certification
for additional activities!

**Discussion:** What is a hazard?

Have students work individually or in groups to define what a hazard is and how it pertains to severe weather. Definitions should include that a hazard is a situation that poses a level of threat to life, health, property, or environment.

Activity: What Causes Weather Hazards?

In groups or pairs, have students prepare presentations about the causes of one of the weather hazards talked about in the previous days. Presentations should include the effects of the weather hazard and how the students can prepare for and help prevent the hazard. If their hazard has a rating system, students should explain the categories and what they mean. Using a collaborative medium*, have students use the resources from the activities in the lessons and in the unit resources to prepare their presentations.

Science Journal Prompt:

During the presentations, have students take notes about how each of the different weather hazards are formed. For each hazard, prepare a statement that describes the conditions necessary for each hazard to form.

Optional: Use [*Weather Ready Nation*](#) and [*Disaster Preparedness Activity Book*](#) to help students with emergency preparedness.

**Book Creator, powerpoint, posters, demonstrations, [audio recordings](#), or [commercials](#).*

The [Nat Geo Kids Wacky Weather Playlist](#) could be used as an example or guide for a possible project.



Science Journal Prompt:

Based on the weather data we have collected, I predict the Fox River will.....
Have students predict the conditions they expect to find during their visit to EB Shurts.

Field Experience: Severe Weather Field Experience

Students will visit E.B. Shurts Environmental Education Center to see and learn how severe weather affects the Fox River and other water resources in Waukesha. Students will spend all day outdoors with the opportunity to explore and observe the river directly using waders and nets to collect our local aquatic organisms as well as test for water quality.

Time will also be spent investigating how humans impact the watershed and how we can be part of the solution for protecting our natural resources.

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Science Journal Prompt:

Throughout the day, have students take notes, in their science journals or as a class about the conditions and aquatic organisms they are finding in the river and if these conditions match their predictions. Have students explain why or why not the predictions match the actual conditions.

Discussion: Connecting weather and water quality

Connect the weather data the class has been gathering to the current water quality of the Fox River. Pose questions such as *What would happen to the river had there been more/ less/ rain? Snow-melt?* To lead the class to talk about how normal and severe weather affect the river.

Science Journal Prompt:

Weather can affect rivers and water bodies by.....
Have students finish the sentences and give supporting details.

All SDW teachers should schedule this program directly through SDW Env. Ed.

Science Journal Prompt: Engineering Inquiry

How can we reduce the impact of weather-related hazards?

Have students make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem.

Activity: Design A Solution

Students will design a solution that reduces the impacts of a flood-related hazards on the Fox River. They should focus on the impacts made (choose one) before, during, or after a flood.

Be sure to include how the solution affects:

- Life
- Health
- Environment
- Property

2103 Young Science Challenge
Winner: Peyton Robertson

Watch: [What is a Floodplains by Design?](#)

	4	3	2	1
3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather related hazard,	I can apply a design solution that reduces the impacts of a weather-related hazard to a real life severe weather.	I can make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard providing evidence from scientific sources.	I can make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.	I can identify a design solution that reduces the impact of a weather-related hazard.

[Request A Program
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Books:

[Wildfires!](#)
[Weather](#)
[Storms](#)
[Fire in the Forest](#)
[Forest Fire!](#)
[Droughts](#)
[Thunder and Lightning](#)
[Hurricane!](#)

Videos:

[Worst Drought in 30 Years hits South Africa](#)
[Inside the Fire](#)
[Outdoor Wisconsin: Pickeral Burn](#)
[Filming A Raging Forest Fire](#)
[How Do Tornadoes Form?](#)
[How Tsunamis Work](#)
[8 Extreme Weather Records From Around
The World](#)
[Cold Front vs. Warm Front](#)
[Sea vs Land Breeze](#)
[Tornadoes 101](#)
[How to Decode a Weather Forecast](#)
[Why Hurricane Categories Make a Difference](#)
[Wind](#)
[The Coriolis Effect](#)
[Why Do Floods Happen?](#)

Activities:

[Soil Moisture Activity](#)
[Radiation and Albedo Experiment](#)
[Printable Weather Chart](#)
[Mapping Extreme Natural Events](#)
[WeatherWiz Kids](#)
[Extreme Weather Simulator](#)
[Disaster Detector](#)
[Weather Lab](#)
[The Doppler Effect](#)
[Weather Watch](#)

Websites:

[Drought For Kids](#)
[Questions and Answers About Droughts](#)
[Winter Storms](#)
[Lightning](#)
[How Lightning Works](#)
[How Does a Hurricane Form?](#)
[Severe Weather 101](#)
[More to Explore: Weather and Climate](#)
[Watch Out....Storms Ahead](#)
[Cloud Lab Collection](#)

Using the Numbers template

Numbers is a free app for the iPad that is available in Self Service on student and teacher iPads. It is a spreadsheet and data visualization tool that will help students to record data and then see how that data appears in the graph.

Using the Tabs in the Spreadsheet

Each spreadsheet has a table and a graph. The goal of these sheets is to give students a place to record data for the varying data points. When students have collected data, they will type directly into the table, indicating the date and any other information the table allows them to input. Each factor has two data sets available to allow students to contrast and compare data from two different locations, for example: Waukesha and another location of your choice.

Notes/Notas Tab

The Notes/Notas tab is intended to allow students to record their thinking as they move through this unit. Teachers will need to specify for students how this tab is to be utilized and how often students should record their thinking in this sheet.

Design Solution Tab

As a part of this unit, students will be asked to develop a Design Solution. They will need to sketch their Design Solution and then place this image into the Numbers template in the Design Solution tab.

Sketching a Design Solution

While there are many ways students can sketch/create their design solution, one recommended way is by using the Notes app on the iPad.

To sketch in the Notes app:

1. Open Notes
2. Click the drawing tool
3. Sketch the design solution, label, etc.
4. Send the drawing (when finished) to the iPad camera roll
5. From the camera roll, the sketch can be uploaded to the Design Solution tab



Water Education for Teachers

Resources

PROJECT WET TRAINING

Project WET (Water Education for Teachers) is a collection of hands-on activities designed and tested by teachers to educate K-12 students about water. Training to receive and use the WET guidebook can be scheduled for your school or district at your convenience with a minimum of 6 participants.

- Learn how to use the hands-on activities, including water quality testing and macro-invertebrate sampling
- Share ideas and tips with other teachers
- Learn about local program resources

There is a \$30.00 fee for each guidebook ordered. Call 262.896.8300 or email water@waukeshacounty.gov to schedule a training.

Waukesha County, Waukesha School District, and Carroll University have collaborated to create a comprehensive, interdisciplinary K-12 science and environmental education curriculum fully integrated with NGSS Science and Literacy standards.

The goal of this curriculum is to create more scientifically and environmentally literate citizens with the ability to understand and critically assess current scientific and environmental issues, along with a desire and ability to engage in these issues. This project focuses on improving efficiencies through program coordination among partners as well as building comprehensive approaches.

